

ation, then accounting and economic profits are equal. Therefore, it is the divergence between accounting and economic depreciation that causes the accounting and economic profit divergence. If depreciation is a relatively unimportant part of profitability, then the difference between accounting and economic profits should be small. To test for the impact of depreciation, the equation with profits/sales as the dependent variable was reestimated using profits before depreciation in the numerator. The statistical significance (using a 5 percent cutoff) of five of the twenty-three independent variables change as a result of the exclusion of depreciation from profits. These include minimum efficient scale, supplier concentration, industry vertical integration, industry advertising, and industry *R&D*. Therefore, mismeasurement of accounting profits does present some potential for distorting certain structure-profit results. However, F-M appear to be incorrect in their implication that the profit-concentration relationship is one of the results affected, since inferences concerning market share and the concentration ratio were not effected. This exercise was repeated using profit + depreciation/assets + accumulated depreciation as the dependent variable. The changes were even less significant.

V. General Evidence of Accounting Profits Usefulness

Fisher and McGowan ignore a substantial amount of evidence which demonstrates the usefulness of accounting profit data. For example, a sizable literature exists relating accounting profit to stock market values. After an extensive review of this literature, William Beaver (1981) concluded that almost all studies show a significant positive relationship between accounting earnings changes and stock market price changes, and that prices behave as if accounting earnings data "...are a potentially important source of information, but only one of many sources" (p. 118). Assuming that the stock market reflects knowledge of economic profits, accounting profits must do the same, at least to some degree, if investors consider them useful.

Accounting profit data are used to evaluate numerous economic issues besides questions in industrial organization. F-M have little justification for focusing solely on their use in evaluating monopoly. Many studies have used accounting profits to demonstrate the efficiency of large firms. Why not title the paper "On the Misuse of Accounting Rates of Return to Infer Efficiency?" The investment-profit literature is just as vast and important in terms of public policy as the profit-concentration literature, yet F-M did not even reference this literature, despite the fact that rate of return is the central concept in the investment literature. The growth and productivity literature implicitly assumes depreciation and assets are correctly measured. Even many basic measurements in macroeconomics, such as *GNP*, are dependent on accounting profit data. Therefore, the implication of F-M's work, if correct, is that most of applied economics is misguided.

The broad use of accounting profit data in the private sector suggests that F-M's general conclusions about the uselessness of the data must be wrong. They are certainly valuable by a simple market test—private firms spend vast resources collecting and analyzing them. A large number of commercial information services (Dun and Bradstreet, Moodys, Value Line, Standard and Poors, COMPUSTAT, etc.) supply data on accounting profit rates and/or comparative analyses across firms or industries. Given the amount spent in the private sector on analyses of accounting profit data, a substantial market failure is required to explain such an occurrence if the data are valueless.

VI. Conclusion

The flaws detailed above substantially limit the applicability of F-M's work. The evidence they presented does not support the conclusion that accounting profit figures are meaningless. The paper simply implies that individual accounting profit numbers can under certain circumstances deviate significantly from economic profits. However, there is no evidence that large deviations exist on average. Fisher and McGowan are equally wrong in their contention that the profit-con-

centration literature is a "misleading enterprise." They give no indication as to how accounting mismeasurement biases the profit-concentration relationship. The evidence presented in this comment suggests a bias does not exist.

REFERENCES

- Bain, Joe. S., "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940," *Quarterly Journal of Economics*, August 1951, 65, 293-324.
- Beaver, William H., *Financial Reporting: An Accounting Revolution*, Englewood Cliffs: Prentice-Hall, 1981.
- Benston, George J., "The FTC's Line of Business Program: A Benefit-Cost Analysis," in Harvey Goldschmid, ed., *Business Disclosure: Government's Need to Know*, New York: McGraw-Hill, 1979, 58-118.
- Breit, William and Elzinga, Kenneth G., "Information for Antitrust and Business Activity: Line of Business Reporting," in Kenneth W. Clarkson and Timothy J. Muris, eds., *The Federal Trade Commission since 1970: Economic Regulation and Bureaucratic Behavior*, Cambridge: Press Syndicate of the University of Cambridge, 1981, 98-120.
- Cowling, Keith and Waterson, Michael, "Price-Cost Margins and Market Structure," *Economica*, August 1976, 43, 267-74.
- Feldstein, Martin S. and Summers, Lawrence H., "Is the Profit Rate Falling?," *Brookings Papers on Economic Activity*, 1:1977, 211-28.
- Fisher, Franklin M. and McGowan, John J., "On the Misuse of Accounting Rates of Return to Infer Monopoly Profits," *American Economic Review*, March 1983, 73, 82-97.
- Gollop, Frank M. and Roberts, Mark J., "Firm Interdependence in Oligopolistic Markets," *Journal of Econometrics*, August 1979, 10, 313-31.
- Long, William F., "Market Share, Concentration and Profits: Intra-industry and Inter-industry Evidence," unpublished paper, Federal Trade Commission, 1982.
- _____, Lean, David F., Ravenscraft, David J., and Wagner, Curtis L. III, *Benefits and Costs of the Federal Trade Commission's Line of Business Program*, Washington: Federal Trade Commission, 1983.
- _____, and Ravenscraft, David J., "The Usefulness of Accounting Profit Data: A Comment on Fisher and McGowan," Working Paper No. 94, Federal Trade Commission, June 1983.
- Ravenscraft, David J., "Structure-Profit Relationships at the Line of Business and Industry Level," *Review of Economics and Statistics*, February 1983, 65, 22-31.
- _____, "Transfer Pricing and Profitability," unpublished paper, Federal Trade Commission, 1981.
- Stauffer, Thomas R., "Measurement of Corporate Rates of Return," unpublished doctoral dissertation, Harvard University, 1971.
- Stigler, George J., *Capital and Rates of Return in Manufacturing Industries*, Princeton: National Bureau of Economic Research, 1963.
- Weiss, Leonard W., "The Concentration-Profits Relationship and Antitrust," in Harvey J. Goldschmid et al., eds., *Industrial Concentration: the New Learning*, Boston: Little, Brown and Company, 1974, 184-232.
- Young, Allan H., "New Estimates of Capital Consumption Allowances in the Benchmark Revision of GNP," *Survey of Current Business*, October 1975, 55, 14-16, 35.
- U.S. Federal Trade Commission, *Quarterly Financial Report for Manufacturing, Mining and Trade Corporations: First Quarter, 1979*, Washington, 1980.
- _____, *Annual Line of Business Report-1975*, Washington, 1981.

The Misuse of Accounting Rates of Return: Comment

By STEPHEN MARTIN*

It is better to light one candle than
curse the darkness.

Motto of the Christopher Society

In a recent paper (1983), Franklin Fisher and John McGowan argue that the large empirical literature that purports to examine the relationship between market concentration and profitability in fact does not do so, and that such exercises with accounting measures of profitability are meaningless.

These conclusions are based on the following series of propositions:

1) empirical investigations of the relationship between concentration and profitability "uniformly" measure profitability as a rate of return on assets or stockholders' equity;

2) the discount rate that makes the present value of an income stream equal to the expenditure that generates the income stream is the only measure of profitability which is "correct" for economic analysis;

3) (as shown by a series of examples) accounting measures of the rate of return on assets are very poor proxies for this "correct" rate of return.

I wish to make the following points: (a) proposition 1) is inaccurate as a description of the literature that investigates the relationship between concentration and profitability; (b) proposition 2), that what Fisher and McGowan label "the economic rate of return" is the only correct measure of profitability for economic analysis, is unconvincing, since a quite different measure of profitability emerges from familiar formal models of firm behavior; (c) the Fisher-McGowan examples illustrate a property of accounting measures of assets that is well

known to students of industrial organization. I will discuss each of these points in turn.

I. Empirical Studies of Profit and Concentration

Fisher and McGowan indicate:

The large volume of research investigating the profits-concentration relationship uniformly relies on accounting rates of return, such as the ratio of reported profits to total assets or to stockholders' equity as the measure of profitability to be related to concentration. [p. 82]

As a description of the literature reporting studies of the relationship between concentration and profitability, this is simply incorrect. A large number of studies, possibly a majority, measure profitability as a rate of return on sales. This includes all studies that use the well-known "price-cost margin" computed from Census of Manufactures data (see my 1979 article, p. 474). Many of these studies are discussed in the literature surveys that are cited by Fisher and McGowan (Leonard Weiss, 1974; F. M. Scherer, 1980). Weiss (p. 199) suggests that such a measure is superior to other measures of profitability; so does Scherer (p. 269), who describes the rate of return on stockholders' equity and the rate of return on capital as "second-best" in comparison with the rate of return on sales.

II. Measuring Profitability for Economic Analysis

Fisher and McGowan state:

The economic rate of return on an investment is...that discount rate that equates the present value of its expected net revenue stream to its initial outlay. ...it is clear that it is the economic rate of return that is equalized within an industry in long-run industry competitive equilibrium and (after adjustment for risk) equalized everywhere

*Associate Professor, Department of Economics, Michigan State University, East Lansing, MI 48824-1038. I am grateful to M. A. Adelman and Franklin Fisher for useful comments; responsibility for errors is my own.

in a competitive economy in long-run equilibrium. It is an economic rate of return (after risk adjustment) above the cost of capital that promotes expansion under competition and is produced by output restriction under monopoly. *Thus, the economic rate of return is the only correct measure of the profit rate for purposes of economic analysis.*

[p. 82, emphasis added]

The conclusion that what Fisher and McGowan call the economic rate of return is the only correct measure of the profit rate for purposes of economic analysis is thus based on an appeal to the economic theory of the behavior of the profit-maximizing firm. It is, however, well known that another measure of profitability arises naturally in formal models of profit-maximizing firm behavior: the Lerner index of monopoly power, the price-marginal cost margin.

Many studies of the relation between concentration and profitability have used models of the price-cost margin.¹ It manifests itself not only in models of output determination under conditions of market power, but also in models of various sorts of conduct (such as advertising or research and development).²

It is doubtful whether any measure of profitability can be unambiguously identified as "correct," to the exclusion of all others, for purposes of economic analysis. Fisher and McGowan's discussion of what they call "the economic rate of return" does not establish that measures of profitability based on the Lerner index are inappropriate for economic analysis.

At this point it is convenient to formally derive a version of the Lerner index. Consider a firm that combines the services $L(t)$ of labor and $K(t)$ of capital according to a continuous, twice differentiable production function $Q = F(L, K)$.³ Output is sold at a

price given by a continuous, twice differentiable inverse demand function $p(Q)$.⁴ The services of labor are hired in a competitive labor market at wage $w(t)$. Capital is purchased at price $p^k(t)$. Capital stock depreciates at rate $\delta(t)$,⁵ so that investment at time t is

$$(1) \quad I(t) = \dot{K}(t) + \delta(t)K(t),$$

where the dot indicates the time derivative.

The firm acts to maximize the present discounted value of net cash flow,

$$(2) \quad \pi = \int_{t=0}^{\infty} e^{-rt} \{ p[F(L(t), K(t))] F(L(t), K(t)) - w(t)L(t) - p^k(t)I(t) \} dt.$$

First-order necessary conditions for profit maximization follow by substituting (1) into (2) and applying Euler's equation from the calculus of variations. They are

$$(3) \quad Qp'(Q)F_L(L, K) + p(Q)F_L(L, K) = w$$

$$(4) \quad Qp'(Q)F_K(L, K) + p(Q)F_K(L, K) = (r + \delta)p^k - \dot{p}^k = \lambda p^k$$

where

$$(5) \quad \lambda = (r + \delta) - (\dot{p}^k/p^k)$$

is the shadow rental of the quantity of capital

standard neoclassical model is worth investigating, not as an exact description of reality but as a useful approximation to reality. For a specific discussion of aggregation and empirical studies of industrial organization, see my paper with David Ravenscraft (1982).

⁴The firm may be a pure monopolist or a producer in a monopolistically competitive industry. The demand function and the production function may be made to depend on time without altering the nature of the results.

⁵As δ is allowed to vary over time, this is not a "Santa Claus" case (Fisher and McGowan, p. 92). It is possible to endogenize the rate of depreciation (as a function of the intensity of use of capital) without altering the nature of the results.

¹For example, Joe Bain (1956, pp. 7; 190-91); Norman Collins and Lee Preston (1970, p. 10); Stephen Rhoades and Joe Cleaver (1973, p. 91); Keith Cowling and Michael Waterson (1976); see also S. J. Liebowitz (1982, p. 231, fn. 1).

²Richard Schmalensee (1972, pp. 20-43); Douglas Needham (1975); John Cubbin (1981).

³For references to the extensive literature on aggregation, see Robert Solow (1956) or Fisher (1969). The

that may be purchased for a dollar (and functional dependence on time has been suppressed for compactness).

Equations (3) and (4) may be rewritten

$$(6) \quad (p - w/F_L)/p = 1/\epsilon_{Qp}$$

$$(7) \quad (p - \lambda p^k/F_K)/p = 1/\epsilon_{Qp}$$

where ϵ_{Qp} is the price elasticity of demand. Of course, equations (6) and (7) are just two different ways of writing the Lerner formula, since marginal cost is

$$(8) \quad MC = w/F_L = \lambda p^k/F_K.$$

Equations (6) and (7) thus imply

$$(9) \quad (p - MC)/p = 1/\epsilon_{Qp}$$

and the Lerner index of monopoly power, the price-marginal cost margin, has emerged from a formal, dynamic, intertemporal model of profit-maximizing firm behavior.

It is important to note that the optimal conditions for factor employment at time t (equations (6) and (7)) and the equivalent Lerner index depend only on values that are known at time t , a property that Kenneth Arrow terms "myopia":

...[P]erhaps the most striking feature of the optimal policy is its independence of future movements of the profit function. This function, it must be remembered, incorporates all knowledge of market conditions both for the selling of the product and for the purchasing of inputs; it also incorporates all aspects of technology other than depreciation of equipment. In particular, the future shifting of technological knowledge plays no role in present investment decisions.

The myopic property of the optimal capital policy implies a considerable economy of information needs in the firm's decision making process, perfectly comparable to the use of the price system for decentralization.

Until very recently the myopic property was largely unremarked in the literature. Indeed, the usual formu-

lation, for example, Keynes's use of the marginal efficiency of capital, ... requires comparison of the present value of all future returns for a given investment with the investment cost. This procedure is not unambiguous... its most significant defect is to concentrate attention on the choice between undertaking an investment and not undertaking it at all, whereas the myopic rule is based on comparison between undertaking the investment now and postponing it for a short period.

[1964, pp 27-28]

When factor markets work—when the price system allows decentralization in factor markets—the myopic property similarly allows a considerable economy of information in the assessment of profitability, by use of measures based on the Lerner index rather than present value calculations.

Such measures of profitability will be suitable for samples of firms or industries that employ relatively nonspecific, tradable capital assets (such as wholesale or retail trade; see my forthcoming article and Bruce Marion et al., 1979).⁶ Such measures of profitability will be appropriate for samples drawn from populations that employ specialized, imperfectly tradable capital assets, if the degree of specificity of assets is roughly constant over the sample (Blake Imel et al., 1972). Such measures of profitability will be appropriate for broad cross-section samples if one controls for variations across the sample in the nature of markets for capital assets (and it can be argued that conventional measures of absolute capital requirements and entry conditions do this, in an imperfect way).

The myopic property of the Lerner index also reflects the fundamental differences between the conventional neoclassical view of the production process, that underlies the model presented here, and the view of the production process that is implicit in the Fisher-McGowan examples. The firm is

⁶Alternatively, one may say that sunk costs should be small and fixed assets traded in markets which work well; see William Baumol et al. (1982, pp. 280-82 and fn. 2).

modeled here as an ongoing concern, acquiring fixed and variable factors to produce output that is marketed on a continuing basis; decisions are made by evaluating the consequences of marginal changes. The examples presented by Fisher and McGowan involve what might be called "oilfield production": as asset is acquired, a project is undertaken, the project yields a time stream of returns, the asset is used up, the project is ended.⁷ Ongoing firms in the Fisher-McGowan examples are simply collections of such assets, that are not traded once a project commences.

III. The Lerner Index and Accounting Measurements

Fisher and McGowan cannot establish that what they call the economic rate of return is the unique correct measure of profitability for purposes of economic analysis. They simply fail to discuss the large portion of the empirical literature relating concentration to measures of profitability based on the Lerner index. Their conclusions concerning the literature that relates concentration and profitability are thus not established by their arguments.

However, their examples do illustrate an important property of accounting data, one that has implications for the use of the Lerner index. I show this by specializing equation (9) and obtaining an expression for the Lerner index that can be related to empirical studies employing rates of return on sales as measures of profitability.

Suppose the production function exhibits constant returns to scale; as noted by William Baumol et al. (p. 33), this is the leading empirical case. Under constant returns to scale, marginal cost and average cost are the same. Formally, from (8),

$$(10) \quad wL + \lambda p^k K = MC(LF_L + KF_K) \\ = MC(Q),$$

⁷As noted by Fisher and McGowan (p. 84, fn. 9), it is not the wearing out of assets that is critical. I use the term "oilfield production" with reference to Richard Mancke (1974), who runs simulations based on assumptions similar to those of the Fisher-McGowan examples.

so that

$$(11) \quad MC = (wL + \lambda p^k K)/Q = AC,$$

and the Lerner index (9) may be rewritten as

$$(12) \quad (pQ - wL)/pQ = 1/\epsilon_{Qp} + \lambda p^k K/pQ.$$

Without loss of generality, L may be interpreted at this point as a vector of variable factors, with w a conformable vector of factor prices. The left-hand side of (12) is then the margin of revenue over the cost of variable inputs, as a fraction of revenue (or equivalently the margin of price over average variable cost, as a fraction of price). This clearly corresponds to the widely used "price-cost margin" computed from Census of Manufactures data,⁸ and to profit rates on sales computed from other sources.

Most simply, it may then be argued that the price elasticity of demand for the product of a single firm will be a function of industry characteristics (including but not limited to market concentration and entry conditions); more formal approaches are possible (for example, Keith Cowling and Michael Waterson). Aggregation to the industry level raises the well-known industry boundary problem—the classification of firms or divisions of firms into industries—but equation (12) clearly provides a framework that encompasses many empirical studies of profitability at the firm and industry level. Such studies should, of course, control for differences between average and marginal cost; conventional measures of minimum efficient scale and the cost disadvantage of smaller firms serve this role. It is generally

⁸For specific discussions of the price-cost margin as computed from Census of Manufactures data, see Weiss (p. 199) or Scherer (pp. 271–72). Liebowitz criticizes the census price-cost margin by comparison with Internal Revenue Service data. Scherer identifies two major problems with IRS data: the assignment of entire firms to a single industry (p. 270) and the impact of accounting rules that are followed for tax purposes only (p. 272). Liebowitz corrects for the first problem (pp. 238–39, fn. 22); he recognizes the second (p. 238, fn. 21) and assumes it can be ignored. There is no reason to think that this is the case; his results can be interpreted as confirming the suitability of census data.

recognized that a capital-sales ratio should be included as an explanatory variable when profitability is measured as a rate of return on sales, and (12) provides a formal rationale for this.

The force of the Fisher-McGowan examples, applied to (12), is that accounting measures of the value of the capital stock are likely to be poor measures of the economic value of such assets, so that the capital-sales ratio, the second right-hand side term in (12), will be subject to serious measurement error.

It should first be noted that although the Fisher-McGowan examples make this point with great clarity, it is not new. It is discussed by Scherer (pp. 272-73); it is discussed by Weiss (pp. 196-97); it is discussed and specifically addressed by studies which employ stock market measures of asset value (James Bothwell and Theodore Keeler, 1976; Timothy Sullivan, 1977; Stavros Thomadakis, 1977).⁹

Somewhat more generally, the Fisher-McGowan examples suggest that since accounting measures of the value of capital are likely to be flawed, accounting techniques should themselves be the subject of analysis. As noted by Nicholas Gonedes and Nicholas Dopuch (1979, p. 407),¹⁰ this is only possible where data sets include information on the nature of the accounting conventions used to record asset values. The only major cross-section data set that includes this information is the Federal Trade Commission's Line of Business data set. Two studies that examine the robustness of results of concentration-profitability studies to the use of alternative accounting conventions and alternative definitions of capital stock find that such results are robust.¹¹

⁹As noted by Thomadakis (p. 181, fn. 1), this measurement error is a serious problem only if systematically related to market structure.

¹⁰Gonedes and Dopuch are critical of studies that criticize accounting measures of income with reference to "true" or "ideal" concepts of income (pp. 384-85). They assert that the fundamental problem of accounting measurement arises in the context of incomplete or imperfect markets (p. 392, fn. 10).

¹¹William Long (1981); my 1981 manuscript. The Long paper employs what Gonedes and Dopuch call a

IV. Conclusion

The price-average cost margin or rate of return on sales is a measure of profitability which may be used for economic analysis. Fisher and McGowan have demonstrated the well-known point that accounting measures of capital intensity are likely to be inaccurate. This should be, and has been, considered in carrying out empirical studies of the concentration-profitability relationship. The literature that relates concentration to rates of return on sales constitutes a well formulated body of empirical economic research, and examination of absolute or relative price-cost margins to draw conclusions about market power can be expected to yield accurate information about structure-conduct-performance relationships.

recomputation technique. The Fisher-McGowan paper is an example of what Gonedes and Dopuch call the simulation approach. As Gonedes and Dopuch note, "Neither approach dominates another in terms of insights provided" (p. 400).

REFERENCES

- Arrow, Kenneth J., "Optimal Capital Policy, the Cost of Capital, and Myopic Decision Rules," *Annals of the Institute of Statistical Mathematics*, 1964, 16, 21-30.
- Bain, Joe S., *Barriers to New Competition*, Cambridge: Harvard University Press, 1956.
- Baumol, William J., Panzar, John C. and Willig, Robert D., *Contestible Markets and the Theory of Industry Structure*, New York: Harcourt Brace Jovanovich, 1982.
- Bothwell, James L. and Keeler, Theodore E., "Profits, Market Structure and Portfolio Risk," in Robert T. Masson and P. David Qualls, eds., *Essays on Industrial Organization in Honor of Joe S. Bain*, Cambridge: Ballinger Publishing Company, 1976, 71-88.
- Collins, Norman R. and Preston, Lee E., *Concentration and Price-Cost Margins in Manufacturing Industries*, Berkeley: University of California Press, 1970.

- Cowling, Keith and Waterson, Michael, "Price-Cost Margins and Market Structure," *Economica*, August 1976, 43, 267-74.
- Cubbin, John, "Advertising and the Theory of Entry Barriers," *Economica*, August 1981, 48, 289-98.
- Fisher, Franklin M., "The Existence of Aggregate Production Functions," *Econometrica*, October 1969, 37, 553-57.
- _____ and McGowan, John J., "On the Misuse of Accounting Rates of Return to Infer Monopoly Profits," *American Economic Review* March 1983, 73, 82-97.
- Gonedes, Nicholas J. and Dopuch, Nicholas, "Economic Analyses and Accounting Techniques: Perspective and Proposals," *Journal of Accounting Research*, Autumn 1979, 17, 384-410.
- Imel, Blake, Behr, Michael R. and Helmberger, Peter G., *Market Structure and Performance*, Lexington: D. C. Heath, 1972.
- Liebowitz, S. J., "What Do Census Price-Cost Margins Measure," *Journal of Law and Economics*, October 1982, 25, 231-46.
- Long, William F., "Impact of Alternative Allocation Procedures on Econometric Studies of Structure and Performance," manuscript, Line of Business Program, Federal Trade Commission, July 1981.
- Mancke, Richard B., "Causes of Interfirm Profitability Differences: A New Interpretation of the Evidence," *Quarterly Journal of Economics*, May 1974, 88, 181-93.
- Marion et al., Bruce W., "The Price and Profit Performance of Leading Food Chains," *American Journal of Agricultural Economics*, August 1979, 61, 420-33.
- Martin, Stephen, "Entry Barriers, Concentration, and Profits," *Southern Economic Journal*, October 1979, 46, 471-88.
- _____, "Modeling Profitability at the Line of Business Level," manuscript, Line of Business Program, Federal Trade Commission, August 1981.
- _____, "Structure and Performance of U.S. Wholesale Trade," *Managerial and Decision Economics*, forthcoming, 1984.
- _____ and Ravenscraft, David J., "Aggregation and Studies of Industrial Profitability," *Economics Letters*, No. 1; 2, 1982, 10, 161-65.
- Needham, Douglas, "Market Structure and Firms' R&D Behavior," *Journal of Industrial Economics*, June 1975, 23, 241-55.
- Rhoades, Stephen A. and Cleaver, Joe. M., "The Nature of the Concentration-Price/Cost Margin Relationship for 352 Manufacturing Industries: 1967," *Southern Economic Journal*, July 1973, 40, 90-102.
- Scherer, F. M., *Industrial Market Structure and Economic Performance*, Chicago: Rand McNally, 1980.
- Schmalensee, Richard, *The Economics of Advertising*, Amsterdam: North-Holland, 1972.
- Solow, Robert M., "The Production Function and the Theory of Capital," *Review of Economic Studies*, No. 2, 1956, 23, 101-8.
- Sullivan, Timothy G., "A Note on Market Power and Returns to Stockholders," *Review of Economics and Statistics*, February 1977, 59, 108-13.
- Thomadakis, Stavros B., "A Value-Based Test of Profitability and Market Structure," *Review of Economics and Statistics*, May 1977, 59, 179-85.
- Weiss, Leonard W., "The Concentration-Profits Relationship and Antitrust," in Harvey J. Goldschmid et al., eds., *Industrial Concentration: the New Learning*, Boston: Little, Brown, and Co., 1974, 184-233.

Appendix F:

Affidavit of Kevin Gavin About Nextel's California Market Share and Technology Capabilities

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

Petition of the People of the State)	
of California and the Public Utilities)	PR Docket No. 94-105
Commission of the State of California)	
to Retain Regulatory Authority over)	
Intrastate Cellular Service)	

AFFIDAVIT

State of California)
) SS.
County of Contra Costa)

KEVIN GAVIN deposes and states:

1. I am the Vice President of Marketing and Product Development of Nextel Communications, Inc. ("Nextel"). My business address is 3675 Mt. Diablo Blvd., Suite 330, Lafayette, CA 94549. The matters stated herein are true of my own knowledge. If called to testify regarding the matters stated herein, I could and would do so competently.

2. By letter dated October 12, 1994, the California Public Utilities Commission ("CPUC") requested Nextel to provide an affidavit describing "Nextel's market share and technology capabilities in California" which the CPUC could use "in a filing before" the Federal Communications Commission ("FCC"). A true copy of the letter from the CPUC is attached hereto as Exhibit 1. Nextel understands that CPUC will file the affidavit in the above-captioned proceeding in connection with its Petition to the FCC for authority to retain jurisdiction over rates charged by cellular carriers in California.

3. Without waiving its position that, pursuant to federal law, it is a private radio carrier and not subject to the jurisdiction of the CPUC, Nextel voluntarily agreed to provide the information requested by the CPUC. This affidavit provides that information.

4. At present, Nextel has approximately 60,000 Specialized Mobile Radio ("SMR") dispatch service customers in California. Nextel's SMR dispatch service uses traditional analog radio technology which offers customers only limited features and functions.

5. At present, Nextel has approximately 6,000 Enhanced Specialized Mobile Radio ("ESMR") mobile units in service in California. Nextel's ESMR service uses digital radio technology which permits its customers to avail themselves of integrated paging (text messaging), private network dispatch, voice mail, and "cellular" (mobile telephone) services. The current Nextel subscriber unit offers all of these integrated services. Nextel does not offer a cellular-only handset at this time. Nextel's current principal focus is to migrate its existing SMR customer base onto its ESMR service, and to target businesses needing its unique combination of wireless communications services.

6. Nextel estimates that its current ESMR customer base in California is three one-thousandths (0.003 or 0.3%) of the cellular carriers' customer base in California of approximately two million mobile units in service.

7. Nextel provides ESMR service in three areas in California: Southern California (Los Angeles basin, from Santa Barbara to Palm Springs), Northern California (San Francisco area, from San Jose to Santa Rosa), and the Central Valley (from Bakersfield to Redding). Nextel plans to expand its service to other areas of California, such as San Diego, in the near future.

8. Nextel commenced commercial ESMR service in Los Angeles six months ago and recently initiated full commercial ESMR service in San Francisco and the Central Valley area. At present,

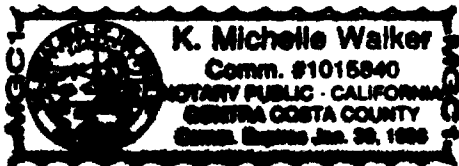
more than 90% of Nextel's approximately 6,000 ESMR mobile units are located in the Los Angeles area.

9. Nextel anticipates expanding its ESMR customer base in California within the next year. Nextel currently has pending orders for ESMR service in California of approximately 11,000 mobile units. If all of its pending orders for ESMR service were placed in operation overnight, Nextel estimates that its customer base would be approximately 8.5 one-thousandths (0.0085 or 0.85%) as large as that of the cellular carriers in California.



Kevin Gavin

Subscribed and sworn to before me this 17 day of October, 1994. My commission expires the 30 day of January, 1998.



Notary Public

PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298



October 12, 1994

Earl Nicholas Selby
Attorney at Law
420 Florence Street
PALO ALTO CA 94301

Dear Nick:

This letter confirms our telephone conversation of October 11, in which the Commission requested and Nextel agreed to send us an affidavit describing Nextel's market share and technology capabilities in California.

As discussed, the California Public Utilities Commission will use this affidavit in a filing before the Federal Communications Commission.

Thank you.

Sincerely,

Jack Leutza

Jack Leutza, Chief
Telecommunications Branch
Commission Advisory and Compliance Division

Appendix G:
Advertisement For Cellular Service

The Best of Both Worlds.



**Go Digital
for the
price of
an Analog!**

\$169*

Micro Digital
Personal Communicator

Motorola Digital Flip Phone

- DUAL MODE works as a digital or analog - so why buy just an analog!
- Up to 50% more battery life.
- More privacy - your calls are encoded.



Call 1-800-599-STAR for the nearest location

ALL INCOMING CALLS FREE

UNTIL 1995! FREE SIGNAL UP FOR A SELECTED DISCOUNT OR DIGITAL RATE PLAN!

Money-Saving Offers

- Buy a digital phone and you can receive a \$300 SERVICE CREDIT on a CellularOne digital plan.
- Lower overall usage cost on digital plans.
- **FREE** incoming calls until 1995!

SAN FRANCISCO

1155 Junipero Serra Blvd.
(415) 406-1161

580 Folsom St.
(415) 882-9626

PLEASANTON

5901 Owens Dr., Ste. B
(510) 734-8500

WALNUT CREEK

2560 North Main St.
(510) 938-8500

San Bruno

777 E. San Bruno Ave.
(415) 873-7747

Redwood City

1707 E. Bayshore Rd.
(415) 599-0200

Fremont

41917 Albrae St.
(510) 490-5263

Palo Alto

2001 El Camino Real
(415) 323-2000

* Phone pictured is \$469 before \$300 service credit. Tax not included. Termination of service within 6 mos. requires repayment of credit. Promotional offers apply to new customers activating on selected rate plans between Sept. 15, 1994 and Oct. 24, 1994. Security and other plans excluded. Occasional Plan receives free incoming calls through Nov. 30, 1994. Activation not required for hardware. Price includes \$25 activation rebate. Other restrictions apply. All Star Cellular locations are independently owned and operated.

Appendix H:

**Data for "1994 Price Regression for Top 30 Cellular Markets,"
Appendix E, Air Touch Opposition**

Appendix H

Data for "1994 Price Regression for Top 30 Cellular Markets" Appendix E, AirTouch Opposition

City	State	Service Provider	Regulation	Min Bill	Monthly Fee	Peak Rate	Off-Peak Rate	Fee Minutes			Income	Commute Time	Population
								Unsp.	Peak	Off Pk			
New York	NY	Cellular One	1	107.19	89.99	0.45	0.35	120			25,405	31.3	8,547
New York	NY	NYNEX Mobile	1	114.35	27.95	0.59	0.39				25,405	31.3	8,547
Los Angeles	CA	Cellular One	1	99.99	99.99	0.39	0.23	170			20,691	26.2	8,863
Los Angeles	CA	AirTouch Comm.	1	99.99	99.99	0.39	0.23	170			20,691	26.2	8,863
Chicago	IL	Cellular One	0	61.46	30	0.31	0.19	50			21,982	28.5	6,070
Chicago	IL	Ameritech	0	56.18	53.1	0.34	0.18	150			21,982	28.5	6,070
Philadelphia	PA	Comcast Cellular	0	80.95	46.95	0.5	0.3		60	60	21,499	24.9	4,857
Philadelphia	PA	Bell Atlantic Mobile	0	81	47	0.5	0.3		60	90	21,499	24.9	4,857
Detroit	MI	Cellular One	0	69.71	51.95	0.33	0.16	100			20,595	23.1	4,382
Detroit	MI	Ameritech	0	63.8	19	0.31	0.16				20,595	23.1	4,382
Dallas	TX	MetroCel Cellular	0	60.55	57.99	0.32	0.17		120	250	19,821	23.5	2,553
Dallas	TX	Southwestern Bell	0	59	59	0.3	0.15		150	200	19,821	23.5	2,553
Boston	MA	Cellular One	1	84.4	61	0.42	0.27	100			24,315	24.1	2,871
Boston	MA	NYNEX Mobile	1	79.91	14.95	0.5	0.33				24,315	24.1	2,871
Washington	DC	Cellular One	0	75.82	44.95	0.49	0.29		65	65	25,363	29	3,924
Washington	DC	Bell Atlantic Mobile	0	77.95	43.95	0.5	0.3		60	60	25,363	29	3,924
San Francisco	CA	Cellular One	1	99.59	79.99	0.44	0.2	110			25,037	26.5	1,604
San Francisco	CA	GTE Mobilnet	1	99.35	75.95	0.39	0.39	100			25,037	26.5	1,604
Houston	TX	Houston Cell. Teleph	0	79.99	79.99	0.29	0.12	160			19,028	25.9	3,302
Houston	TX	GTE Mobilnet	0	80.67	77.95	0.3	0.16	150			19,028	25.9	3,302
Miami	FL	Cellular One	0	95	95	0.33	0.24	215			19,606	28	1,937
Miami	FL	Bell South	0	94.51	59.95	0.43	0.2	70			19,606	28	1,937
Atlanta	GA	AirTouch Comm.	0	85.15	65.95	0.35	0.2	100			20,263	25.6	2,834
Atlanta	GA	Bell South	0	88.31	74.95	0.37	0.19	120			20,263	25.6	2,834
San Diego	CA	AirTouch Comm.	1	83.55	69.95	0.38	0.18	120			19,588	21.9	2,498
San Diego	CA	US West	1	84.15	49.95	0.38	0.19	60			19,588	21.9	2,498
Minneapolis	MN	Cellular One	0	72	72	0.4	0.16	180			21,330	20.4	2,464
Minneapolis	MN	US West	0	79.95	79.95	0.38	0.25	200			21,330	20.4	2,464
St. Louis	MO	CyberTel/Ameritech	0	56.35	44.95	0.3	0.2		90	90	20,200	22.5	2,444
St. Louis	MO	Southwestern Bell	0	79.59	49.95	0.38			50		20,200	22.5	2,444
Baltimore	MD	Cellular One	0	75.82	44.95	0.49	0.29		65	65	21,461	25.4	2,382
Baltimore	MD	Bell Atlantic Mobile	0	77.95	43.95	0.5	0.3		60	60	21,461	25.4	2,382
Phoenix	AZ	Bell Atlantic Mobile	0	73.55	69.95	0.39	0.24	150			18,042	22.9	2,122
Phoenix	AZ	US West	0	85.48	49.95	0.46	0.25	75			18,042	22.9	2,122
Seattle	WA	Cellular One	0	86.99	86.99	0.42	0.23	180			21,087	23.9	1,973
Seattle	WA	US West	0	79.13	74.95	0.46	0.25	150			21,087	23.9	1,973
Pittsburgh	PA	Cellular One	0	69.99	69.99	0.35	0.35	160			18,827	22.6	2,057
Pittsburgh	PA	Bell Atlantic Mobile	0	69.75	49.95	0.35	0.25	100			18,827	22.6	2,057
Tampa	FL	Cellular One	0	88.35	49.95	0.42	0.24	60			18,274	21.4	2,068
Tampa	FL	GTE Mobilnet	0	87.55	49.95	0.42	0.2	60			18,274	21.4	2,068
Denver	CO	US West	0	74.02	70	0.44	0.25	150			20,950	22.2	1,623
Denver	CO	Cellular One	0	73.45	69.99	0.37	0.25	150			20,950	22.2	1,623
Cleveland	OH	Cellular One	0	78.35	55.95	0.35	0.2	90			19,640	22.3	1,831
Cleveland	OH	GTE Mobilnet	0	79.87	49.95	0.39	0.2	75			19,640	22.3	1,831
San Jose	CA	Cellular One	1	99.59	79.99	0.44	0.2	110			25,193	23.2	1,498
San Jose	CA	GTE Mobilnet	1	101.95	49.95	0.4	0.4	30			25,193	23.2	1,498
Kansas City	MO	Cellular One	0	78.35	49.95	0.35	0.02	60			19,482	20.7	1,566
Kansas City	MO	Southwestern Bell	0	72.39	49.95	0.33			60		19,482	20.7	1,566
Cincinnati	OH	Cellular One	0	74.51	52.95	0.34	0.18	90			18,632	21.6	1,453
Cincinnati	OH	Ameritech	0	56.83	18.75	0.26	0.15				18,632	21.6	1,453
Portland	OR	Cellular One	0	70	70	0.29	0.29	180			18,938	20.9	1,240
Portland	OR	GTE Mobilnet	0	62.71	59.95	0.29	0.22	150			18,938	20.9	1,240
Milwaukee	WI	Cellular One	0	57.24	45	0.22	0.14	100			19,665	19.7	1,432
Milwaukee	WI	Ameritech	0	56.83	18.75	0.26	0.15				19,665	19.7	1,432
Sacramento	CA	Cellular One	0	65.92	24	0.29	0.15				19,180	21.6	1,481
Sacramento	CA	AirTouch Comm.	0	56.8	20	0.25	0.15				19,180	21.6	1,481
San Antonio	TX	Cellular One	0	59.99	59.99	0.25	0.25	200			15,517	21.5	1,302
San Antonio	TX	Southwestern Bell	0	59.95	59.95	0.25	0.25	200			15,517	21.5	1,302

Source: AirTouch

Notes: Minimum monthly bill based on 128 minutes of peak calling and 32 minutes of off-peak calling.

Appendix I:
Herfindahl-Hirschman Index Calculations

Appendix I

HHI Calculations

Based on Capacity, per Department of Justice Merger Guidelines

Firms	Pre-SMR Entry			Post-ESMR Entry		
	Bandwidth	Market Share	HHI Contribution	Bandwidth	Market Share	HHI Contribution
Cellular 1	25	50.0%	2,500	25	41.7%	1,736
Cellular 2	25	50.0%	2,500	25	41.7%	1,736
ESMR 3				10	16.7%	278
Totals	50	1	5,000	60	1	3,750

Digital to Analog

1 to 1

Appendix I

HHI Calculations

Based on Capacity, per Department of Justice Merger Guidelines

Firms	Pre-SMR Entry				Post-ESMR Entry			
	Bandwidth	Effective Capacity	Market Share	HHI Contribution	Bandwidth	Effective Capacity	Market Share	HHI Contribution
Cellular 1	25	100	50.0%	2,500	25	100	38.5%	1,479
Cellular 2	25	100	50.0%	2,500	25	100	38.5%	1,479
ESMR 3					10	60	23.1%	533
Totals	50	200	100.0%	5,000	60	260	100.0%	3,491

Digital to Analog 6 to 1
 Cellular Capacity Devoted to Analog 10 mhz

Appendix I

HHI Calculations

Based on Capacity, per Department of Justice Merger Guidelines

Firms	Pre-SMR Entry				Post-ESMR Entry			
	Bandwidth	Effective Capacity	Market Share	HHI Contribution	Bandwidth	Effective Capacity	Market Share	HHI Contribution
Cellular 1	25	100	50.0%	2,500	25	55	39.3%	1,543
Cellular 2	25	100	50.0%	2,500	25	55	39.3%	1,543
ESMR 3					10	30	21.4%	459
Totals	50	200	100.0%	5,000	60	140	100.0%	3,546

Digital to Analog 3 to 1
 Cellular Capacity Devoted to Analog 10 mhz

Appendix J:
Lowest Price Plan Comparison

Appendix J

Lowest Price Plan Comparison

December 1989 to December 1993

Percentage Nominal Price Reduction

Carrier	Bill with Minutes of Use		
	60	120	480
LACTC	0.0%	10.1%	15.7%
LASMSA	0.0%	10.1%	17.3%
BACTC	10.2%	9.8%	9.1%
GTEM-BA	8.0%	9.9%	22.3%
AirTouch	8.5%	10.6%	19.4%
US West	11.4%	9.7%	12.1%
STC	0.0%	0.0%	2.9%
SVLP	0.0%	0.0%	0.0%

Percentage Real Price Reduction

Carrier	Bill with Minutes of Use		
	60	120	480
LACTC	13.8%	22.5%	27.4%
LASMSA	13.8%	22.5%	28.7%
BACTC	22.6%	22.3%	21.7%
GTEM-BA	20.7%	22.4%	33.0%
AirTouch	21.1%	22.9%	30.5%
US West	23.6%	22.2%	24.2%
STC	13.8%	13.8%	16.3%
SVLP	13.8%	13.8%	13.8%

Nominal Price Reductions \$/MOU

Carrier	Bill with Minutes of Use		
	60	120	480
LACTC	0.000	0.080	0.080
LASMSA	0.000	0.080	0.088
BACTC	0.117	0.076	0.045
GTEM-BA	0.092	0.077	0.110
AirTouch	0.080	0.069	0.084
US West	0.107	0.063	0.047
STC	0.000	0.000	0.009
SVLP	0.000	0.000	0.000

Real Price Reduction 1989 \$s/MOU

Carrier	Bill with Minutes of Use		
	60	120	480
LACTC	0.161	0.178	0.139
LASMSA	0.226	0.178	0.146
BACTC	0.260	0.172	0.107
GTEM-BA	0.238	0.173	0.163
AirTouch	0.199	0.149	0.132
US West	0.222	0.144	0.094
STC	0.091	0.064	0.051
SVLP	0.078	0.055	0.038

Lowest Available Rate for Single Phone Plan

Source: Carrier Response to Data Request and Tariffs on file at CPUC

CPI used for deflation: California specific CPI for December

Appendix K:
FCC Reseller Switch Letter

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

September 26, 1991

In reply refer to:
163500-MCP

Lewis J. Paper, Esq.
Keck, Mahin & Cate
1201 New York Avenue
Washington, D.C. 20005-3919

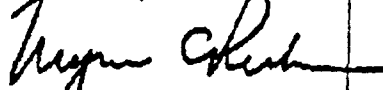
Re: Cellular Service, Inc.

Dear Mr. Paper:

I have reviewed your letter of September 12, 1991 concerning the intention of Cellular Service, Inc. (CSI), a reseller of cellular service, to connect a switch to the facilities of the local exchange carrier and to the MTSO of the local cellular carrier. You state that CSI will use these facilities to facilitate the switching of both intrastate and interstate calls for CSI subscribers. You ask whether this configuration would violate the Communications Act or FCC rules or policies.

To my knowledge your proposal would not violate or be inconsistent with the Communications Act or FCC rules or policies.

Sincerely,



Myron C. Peck, Deputy Chief
Mobile Services Division
Common Carrier Bureau